THICKNESS OF BITUMINOUS-COAL AND LIGNITE SEAMS AT ALL MINES AND THICKNESS OF OVERBURDEN AT STRIP MINES IN THE UNITED STATES IN 1955

BY W. H. YOUNG AND R. L. ANDERSON

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THICKNESS OF BITUMINOUS-COAL AND LIGNITE SEAMS AT ALL MINES AND THICKNESS OF OVERBURDEN AT STRIP MINES IN THE UNITED STATES IN 1955

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W. H. Young[1/] and R. L. Anderson[2/]

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SUMMARY

The thickness of the coal seam is one of the more important items influencing the productivity and general overall efficiency of operation of a coal mine. The average thickness of coal seams mined in the United States decreased 2 inches between 1950 and 1955 to an average of 62 inches, which also is 3 inches less than the 65 inches in 1945. The decrease in thickness is due partly to the increased production from strip mines with thinner seams and partly to the increased percentage of total production at underground mines in certain States having thinner seams. The thickness of seams at auger mines was measured for the first time in 1955 and was 53 inches.

Though bituminous coal and lignite is mined today from seams of exceedingly variable thickness - less than 2 feet to more than 50 feet - a large majority of the production, 65 percent in 1955, came from seams 3 to 6 feet thick. This is not surprising since the coal seam of moderate thickness presents the least mining difficulties.

Table 2 contains 1955 data on productivity and average thickness of seams mined. The correlation between thickness of seam and productivity was not universal; instead, in a number of States great productivity was achieved in thin seams. Conversely, several States had low productivity in thick seams.

Figure 1 shows the percentage of bituminous coal produced, by thickness of seam mined, in the 10 largest coal-producing States and total United States in 1955. The States are arranged in order of the percentage of output mined from seams less than 4 feet thick. Utah had the distinction of producing 86 percent of its coal from seams over 8 feet in thickness in 1955. Tables 3 to 6 show the number and production of bituminous coal and lignite mines classified by 1-foot intervals of seam thickness mined in 1955 for underground, strip, auger, and all mines, by States. In a majority of the States the coal seams for strip mines are thinner than for underground mines. In table 7 the number of mines and production, at 1-foot intervals of seam thickness, are classified by size of mine. The larger mines usually operate in the thicker seams.

In strip mining the depth of cover or overburden to be moved is equally as significant as the thickness of the coal. The average thickness of overburden has been increasing, that is, 31.6 feet in 1946, 39 feet in 1950, and 41.6 feet in 1955. Details, by States, are given in table 8. The cubic yards of overburden excavated per net tons of clean coal mined in 1955 varied from less than 2 in Montana and Wyoming to more than 24 in Kansas.

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INTRODUCTION

The information included in the following tables for the years 1945, 1946, 1950, and 1955, was compiled from annual reports of production and mine operation submitted by bituminous coal and lignite producers to the Bureau of Mines. Estimates were made for seam thickness not specified by the producer. Data for 1920 were compiled from the Report of the United States Coal Commission, part 3, table 11, page 1890, 1925. The figures on thickness of overburden are based on reports from approximately two-thirds of total production.

This report represents mines having an output of 1,000 tons a year or more.

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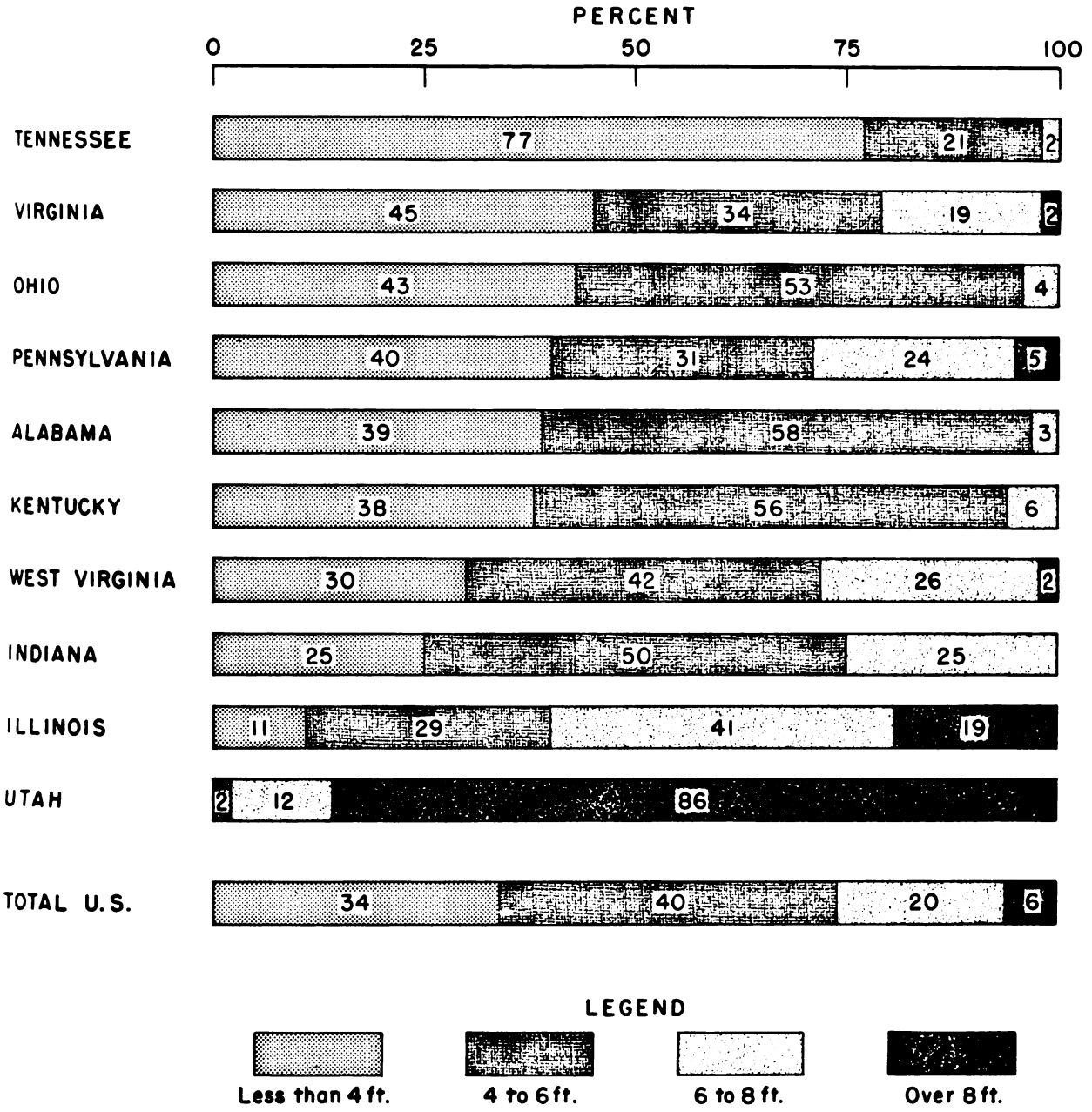

Figure 1. - Percentage of bituminous coal and lignite produced in the 10 largest coal-producing States and total United States, by thickness of seams mined in 1955.

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TABLE 1. - Number and production of bituminous-coal and lignite mines in the United States, classified by thickness of seams mined in 1920, 1945, 1950, and 1955

Thickness of seams mined (feet)	1920				1945			
	Mines		Production		Mines		Production	
	Number	Percentage	Thousand net tons	Percentage	Number	Percentage	Thousand net tons	Percentage
Less than 2	139	1.6	2,481	0.4	126	1.8	6,869	1.2
2 to 3	1,159	13.0	31,353	5.6	936	13.3	32,984	5.7
3 to 4	2,240	25.2	104,356	18.5	2,250	32.0	138,781	24.0
4 to 5	1,792	20.1	126,372	22.4	1,710	24.3	136,348	23.6
5 to 6	1,222	13.7	125,589	22.3	838	11.9	75,132	13.0
6 to 7	559	6.3	76,255	13.5	587	8.4	83,738	14.5
7 to 8	393	4.4	63,333	11.2	260	3.7	51,212	8.9
8 and over	242	2.7	27,852	5.0	326	4.6	52,553	9.1
Unspecified	1,161	13.0	6,165	1.1	---	---	---	---
Total	8,907	100.0	563,756	100.0	7,033	100.0	577,617	100.0

Thickness of seams mined (feet)	1950				1955			
	Mines		Production		Mines		Production	
	Number	Percentage	Thousand net tons	Percentage	Number	Percentage	Thousand net tons	Percentage
Less than 2	138	1.5	3,877	0.8	149	1.9	4,501	1.0
2 to 3	1,291	13.7	35,659	6.9	1,808	23.0	37,336	8.0
3 to 4	4,567	48.4	140,334	27.2	3,048	38.8	115,076	24.8
4 to 5	1,583	16.8	108,458	21.0	1,577	20.1	101,440	21.8
5 to 6	744	7.9	75,115	14.5	565	7.2	83,862	18.1
6 to 7	525	5.6	76,440	14.8	305	3.9	56,845	12.2
7 to 8	250	2.6	35,010	6.8	175	2.2	36,184	7.8
8 and over	331	3.5	41,418	8.0	229	2.9	29,389	6.3
Total	9,429	100.0	516,311	100.0	7,856	100.0	464,633	100.0

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TABLE 2. - Number of mines, production, output per man per day, and average thickness of seams mined, at underground, strip, and auger bituminous-coal and lignite mines in the United States, by States, in 1955

State	Underground mines				Strip mines				Auger mines				Total, all mines			
	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)
Alabama	195	10,970,610	6.25	4.4	39	2,110,979	14.64	3.2	1	6,888	20.00	8.0	235	13,088,477	6.89	4.6
Alaska	6	239,571	5.64	20.7	7	400,125	16.94	23.7	---	---	---	---	13	639,696	9.68	22.6
Arizona	2	8,898	2.78	5.5	---	---	---	---	---	---	---	---	2	8,898	2.78	5.5
Arkansas	19	317,001	4.36	2.6	8	260,725	11.65	1.7	---	---	---	---	27	577,726	6.08	2.2
California (lignite)	---	---	---	---	1	7,650	15.30	8.0	---	---	---	---	1	7,650	15.30	8.0
Colorado	110	3,211,125	5.84	7.1	7	356,805	24.41	6.2	---	---	---	---	117	3,567,930	6.32	7.0
Georgia	6	12,471	2.70	1.5	---	---	---	---	---	---	---	---	6	12,471	2.70	1.5
Illinois	103	27,256,495	14.23	7.3	68	18,675,619	23.87	4.8	---	---	---	---	171	45,932,114	17.02	6.3
Indiana	44	4,967,089	10.66	6.2	56	11,182,221	27.14	4.4	---	---	---	---	100	16,149,310	18.39	5.0
Iowa	30	297,490	4.33	4.5	30	960,867	16.35	3.9	---	---	---	---	60	1,258,357	9.87	4.1
Kansas	5	14,819	3.17	2.7	19	727,463	11.97	1.6	---	---	---	---	24	742,282	11.34	1.6
Kentucky	1,852	54,440,144	8.38	4.4	118	13,643,240	25.36	4.8	34	936,526	19.17	4.4	2,004	69,019,910	9.75	4.4
Maryland	58	275,454	3.82	3.8	26	237,015	12.22	4.7	---	---	---	---	84	512,469	5.60	4.2
Missouri	19	157,103	2.99	3.6	28	3,075,382	20.69	2.5	---	---	---	---	47	3,232,485	16.06	2.6
Montana (bit. & lig.)	19	439,285	7.95	5.8	5	807,968	67.25	23.5	---	---	---	---	24	1,247,253	18.54	17.3
New Mexico	28	174,299	3.86	5.8	3	27,280	14.44	6.3	---	---	---	---	31	201,579	4.28	5.9
North Dakota (lignite)	5	21,357	7.99	10.1	40	3,080,730	35.90	12.1	---	---	---	---	45	3,102,087	35.06	12.1
Ohio	233	12,632,165	8.47	4.8	259	23,958,329	22.83	3.8	38	1,279,297	35.38	4.1	530	37,869,791	14.70	4.2
Oklahoma	14	694,323	4.57	3.7	21	1,469,213	17.75	2.3	---	---	---	---	35	2,163,536	9.22	2.8
Pennsylvania	797	64,904,231	7.19	5.5	585	20,518,113	14.99	3.2	29	291,112	13.50	3.0	1,411	85,713,456	8.23	4.9
South Dakota (lignite)	---	---	---	---	2	25,782	10.31	4.5	---	---	---	---	2	25,782	10.31	4.5
Tennessee	409	5,340,664	5.72	3.9	87	1,635,052	16.72	2.5	8	77,128	11.62	3.3	504	7,052,844	6.79	3.6
Utah	50	6,295,524	9.75	11.1	---	---	---	---	---	---	---	---	50	6,295,524	9.75	11.1
Virginia	1,007	22,241,263	7.19	4.5	31	981,782	13.78	5.0	21	284,465	14.06	4.5	1,059	23,507,509	7.38	4.5
Washington	12	578,076	5.01	7.6	1	31,714	25.66	5.5	---	---	---	---	13	609,790	5.24	7.5
West Virginia	996	126,588,262	8.86	5.1	168	9,379,643	22.96	5.8	73	3,199,984	22.92	4.7	1,237	139,167,889	9.38	5.1
Wyoming	16	1,387,521	9.35	8.0	8	1,539,072	36.32	33.1	---	---	---	---	24	2,926,593	15.34	21.2
Total	6,035	343,465,239	8.28	5.3	1,617	115,092,769	21.12	4.9	204	6,075,400	22.22	4.4	7,856	464,633,408	9.84	5.2

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TABLE 3. - Number and production of bituminous-coal and lignite underground mines in the United States, classified by thickness of seams mined in each State, in 1955

State	Less than 2 feet			2 to 3 feet			3 to 4 feet			4 to 5 feet		
	Number of mines	Production		Number of mines	Production		Number of mines	Production		Number of mines	Production	
		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage
Alabama	14	175,897	1.6	93	1,428,756	13.0	46	1,808,654	16.5	22	3,463,417	31.6
Alaska	---	---	---	---	---	---	---	---	---	---	---	---
Arizona	---	---	---	---	---	---	---	---	---	---	---	---
Arkansas	1	(1)	---	14	259,013	81.7	3	33,249	10.5	---	---	---
Colorado	---	---	---	---	---	---	17	502,645	15.6	18	153,798	4.8
Georgia	6	12,471	100.0	---	---	---	---	---	---	---	---	---
Illinois	---	---	---	---	---	---	4	21,371	.1	36	1,871,991	6.9
Indiana	---	---	---	---	---	---	4	(1)	---	14	820,585	16.5
Iowa	---	---	---	12	94,553	31.8	1	(1)	---	7	63,724	21.4
Kansas	2	(1)	---	2	(1)	---	1	(1)	---	---	---	---
Kentucky	---	---	---	368	3,733,813	6.9	962	19,558,772	35.9	411	15,580,425	28.6
Maryland	---	---	---	25	156,288	56.7	12	44,900	16.3	6	30,892	11.2
Missouri	6	20,038	12.8	3	7,797	5.0	6	69,198	44.0	4	60,070	38.2
Montana (bit. & lig.)	---	---	---	---	---	---	2	(1)	---	4	271,603	61.8
New Mexico	---	---	---	1	(1)	---	8	30,493	17.5	9	29,500	16.9
North Dakota (lignite)	---	---	---	---	---	---	---	---	---	---	---	---
Ohio	---	---	---	7	47,550	.4	88	2,001,321	15.9	89	5,914,267	46.8
Oklahoma	1	(1)	---	7	28,411	4.1	5	474,204	68.3	1	(1)	---
Pennsylvania	---	---	---	110	1,640,290	2.5	373	15,525,564	23.9	138	4,520,229	7.0
Tennessee	1	(1)	---	66	433,475	8.1	254	3,339,465	62.5	59	580,120	10.9
Utah	---	---	---	---	---	---	---	---	---	6	(1)	---
Virginia	1	(1)	---	391	3,914,375	17.6	370	6,409,336	28.8	196	5,351,485	24.1
Washington	---	---	---	---	---	---	1	(1)	---	---	---	---
West Virginia	---	---	---	170	5,853,188	4.6	309	31,956,394	25.2	222	30,648,914	24.2
Wyoming	---	---	---	---	---	---	1	(1)	---	1	(1)	---
Other States	---	60,786	---	---	13,107	---	---	158,650	---	---	288,875	---
Total	32	269,192	.1	1,289	17,610,436	5.1	2,467	81,933,795	23.9	1,243	69,649,895	20.2

State	5 to 6 feet			6 to 7 feet			7 to 8 feet			8 feet and over			Total	
	Number of mines	Production		Number of mines	Production		Number of mines	Production		Number of mines	Production		Number of mines	Production (net tons
		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage		
Alabama	18	3,830,647	34.9	1	(1)	---	1	(1)	---	---	---	---	195	10,970,[illegible]
Alaska	1	(1)	---	---	---	---	---	---	---	5	(1)	---	6	23[illegible]
Arizona	2	8,898	100.0	---	---	---	---	---	---	---	---	---	2	[illegible]
Arkansas	---	---	---	---	---	---	1	(1)	---	---	---	---	19	317,[illegible]
Colorado	20	1,019,761	31.8	24	234,410	7.3	5	160,248	5.0	26	1,140,213	35.5	110	3,22[illegible]
Georgia	---	---	---	---	---	---	---	---	---	---	---	---	6	12,[illegible]
Illinois	14	791,034	2.9	25	7,954,238	29.2	13	8,112,168	29.7	11	8,505,693	31.2	103	27,286,[illegible]
Indiana	8	648,646	13.1	9	2,437,174	49.1	8	1,024,807	20.6	1	(1)	---	44	4,967,[illegible]
Iowa	7	85,917	28.9	3	(1)	---	---	---	---	---	---	---	30	297,[illegible]
Kansas	---	---	---	---	---	---	---	---	---	---	---	---	5	14,[illegible]
Kentucky	87	12,160,950	22.3	20	2,875,577	5.3	2	(1)	---	2	(1)	---	1,852	54,[illegible]
Maryland	2	(1)	---	2	(1)	---	---	---	---	11	28,876	10.5	58	275,[illegible]
Missouri	---	---	---	---	---	---	---	---	---	---	---	---	19	167,[illegible]
Montana (bit. & lig.)	1	(1)	---	3	16,036	3.7	---	---	---	9	70,194	16.0	19	439,[illegible]
New Mexico	4	(1)	---	3	65,766	37.7	---	---	---	3	26,472	15.2	28	174,[illegible]
North Dakota (lignite)	---	---	---	2	(1)	---	1	(1)	---	2	(1)	---	5	21,[illegible]
Ohio	35	3,271,527	25.9	9	1,343,260	10.6	4	(1)	---	1	(1)	---	233	12,632,[illegible]
Oklahoma	---	---	---	---	---	---	---	---	---	---	---	---	14	654,[illegible]
Pennsylvania	76	18,901,402	29.1	51	9,930,828	15.3	32	10,705,249	16.5	17	3,681,149	5.7	797	64,90[illegible]
Tennessee	8	810,280	15.2	1	(1)	---	---	---	---	---	---	---	409	5,34[illegible]
Utah	1	(1)	---	5	484,207	7.7	4	268,845	4.3	34	5,433,591	86.3	50	6,29[illegible]
Virginia	38	2,176,769	9.8	5	2,840,970	12.8	3	1,210,194	5.4	3	(1)	---	1,007	22,24[illegible]
Washington	5	346,149	59.9	---	---	---	2	(1)	---	4	108,968	18.8	12	57[illegible]
West Virginia	110	21,362,595	16.9	87	21,886,595	17.3	73	12,371,890	9.8	25	2,508,666	2.0	996	126,58[illegible]
Wyoming	1	(1)	---	1	(1)	---	3	498,605	35.9	9	709,702	51.2	16	1,38[illegible]
Other States	---	206,416	---	---	327,865	---	---	755,063	---	---	663,391	---	---	---
Total	438	65,620,991	19.1	251	50,396,926	14.7	152	35,107,069	10.2	163	22,876,935	6.7	6,035	343,46[illegible]

1/ Included in "Other States" to avoid disclosure of individual operations.

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TABLE 4. - Number and production of bituminous-coal and lignite strip mines in the United States, classified by thickness of seams mined in each State, in 1955

State	Less than 2 feet			2 to 3 feet			3 to 4 feet			4 to 5 feet		
	Number of mines	Production		Number of mines	Production		Number of mines	Production		Number of mines	Production	
		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage
Alabama	1	(1)	---	32	1,530,491	72.5	1	(1)	---	2	(1)	---
Alaska	---	---	---	---	---	---	---	---	---	---	---	---
Arkansas	6	218,522	83.8	1	(1)	---	1	(1)	---	---	---	---
California (lignite)	---	---	---	---	---	---	---	---	---	---	---	---
Colorado	---	---	---	---	---	---	3	(1)	---	1	(1)	---
Illinois	2	(1)	---	4	44,041	.2	16	5,130,916	27.5	24	5,501,390	29.5
Indiana	3	35,189	.3	10	762,374	6.8	16	3,205,184	28.7	13	4,082,026	36.5
Iowa	---	---	---	---	---	---	18	603,252	62.8	10	(1)	---
Kansas	16	697,690	95.9	1	(1)	---	2	(1)	---	---	---	---
Kentucky	3	(1)	---	23	564,673	4.1	50	2,293,373	16.8	22	4,045,205	29.7
Maryland	---	---	---	10	78,703	33.2	9	71,833	30.3	---	---	---
Missouri	10	661,357	21.5	9	1,726,922	56.2	7	684,202	22.2	1	(1)	---
Montana (bit. & lig.)	---	---	---	---	---	---	---	---	---	---	---	---
New Mexico	---	---	---	---	---	---	---	---	---	---	---	---
North Dakota (lignite)	---	---	---	---	---	---	---	---	---	2	(1)	---
Ohio	4	(1)	---	80	3,987,760	16.6	115	9,662,815	40.3	53	9,511,729	39.7
Oklahoma	11	841,869	57.3	4	204,437	13.9	3	291,549	19.8	3	131,358	9.0
Pennsylvania	46	1,112,241	5.4	235	8,974,024	43.7	187	7,043,152	34.3	69	2,212,365	10.8
South Dakota (lignite)	---	---	---	---	---	---	---	---	---	2	25,782	100.0
Tennessee	15	361,406	22.1	47	971,046	59.4	22	227,050	13.9	2	(1)	---
Virginia	---	---	---	13	(1)	---	5	149,213	15.2	11	410,728	41.8
Washington	---	---	---	---	---	---	---	---	---	---	---	---
West Virginia	---	---	---	15	374,245	4.0	48	2,072,872	22.1	51	2,481,024	26.5
Wyoming	---	---	---	---	---	---	---	---	---	1	(1)	---
Other States	---	303,755	---	---	83,854	---	---	80,910	---	---	614,015	---
Total	117	4,232,029	3.7	484	19,302,570	16.8	503	31,516,321	27.4	267	29,015,622	25.2

State	5 to 6 feet			6 to 7 feet			7 to 8 feet			8 feet and over			Total	
	Number of mines	Production		Number of mines	Production		Number of mines	Production		Number of mines	Production		Number of mines	Production (net tons)
		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage		
Alabama	2	(1)	---	---	---	---	1	(1)	---	---	---	---	39	2,110,979
Alaska	---	---	---	---	---	---	---	---	---	7	400,125	100.0	7	400,125
Arkansas	---	---	---	---	---	---	---	---	---	---	---	---	8	260,725
California (lignite)	---	---	---	---	---	---	---	---	---	1	7,650	100.0	1	7,650
Colorado	---	---	---	---	---	---	---	---	---	3	180,536	50.6	7	356,805
Illinois	13	5,063,572	27.1	8	2,929,511	15.7	1	(1)	---	---	---	---	68	18,675,619
Indiana	10	2,486,187	22.2	4	611,261	5.5	---	---	---	---	---	---	56	11,182,221
Iowa	2	(1)	---	---	---	---	---	---	---	---	---	---	30	960,867
Kansas	---	---	---	---	---	---	---	---	---	---	---	---	19	727,463
Kentucky	18	5,960,693	43.7	2	(1)	---	---	---	---	---	---	---	118	13,643,240
Maryland	---	---	---	1	(1)	---	---	---	---	6	(1)	---	26	237,015
Missouri	1	(1)	---	---	---	---	---	---	---	---	---	---	28	3,075,382
Montana (bit. & lig.)	3	(1)	---	---	---	---	---	---	---	2	(1)	---	5	807,968
New Mexico	2	(1)	---	1	(1)	---	---	---	---	---	---	---	3	27,280
North Dakota (lignite)	2	(1)	---	6	210,668	6.8	7	321,497	10.4	23	2,518,503	81.8	40	3,080,730
Ohio	6	690,191	2.9	---	---	---	---	---	---	1	(1)	---	259	23,958,389
Oklahoma	---	---	---	---	---	---	---	---	---	---	---	---	21	1,469,213
Pennsylvania	30	947,670	4.6	10	117,410	.6	3	16,148	.1	5	95,103	.5	585	20,518,113
South Dakota (lignite)	---	---	---	---	---	---	---	---	---	---	---	---	2	25,782
Tennessee	1	(1)	---	---	---	---	---	---	---	---	---	---	87	1,635,052
Virginia	---	---	---	2	(1)	---	---	---	---	---	---	---	31	981,782
Washington	1	31,714	100.0	---	---	---	---	---	---	---	---	---	1	31,714
West Virginia	21	1,951,161	20.8	13	988,387	10.5	11	639,390	6.8	9	872,564	9.3	168	9,379,643
Wyoming	1	(1)	---	---	---	---	---	---	---	6	1,475,639	95.9	8	1,539,072
Other States	---	447,782	---	---	1,066,028	---	---	99,791	---	---	897,046	---	---	---
Total	113	17,578,970	15.2	47	5,923,265	5.2	23	1,076,826	.9	63	6,447,166	5.6	1,617	115,092,769

1/ Included in "Other States" to avoid disclosure of individual operations.

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TABLE 5. - Number and production of bituminous-coal and lignite auger mines in the United States, classified by thickness of seams mined in each State, in 1955

State	2 to 3 feet			3 to 4 feet			4 to 5 feet		
	Number of mines	Production		Number of mines	Production		Number of mines	Production	
		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage
Alabama -------	---	---	---	---	---	---	---	---	---
Kentucky ------	3	8,373	.9	13	103,617	11.1	18	824,536	88.0
Ohio ----------	10	135,257	10.6	10	345,815	27.0	15	779,746	61.0
Pennsylvania --	14	151,187	51.9	15	139,925	48.1	---	---	---
Tennessee -----	3	12,592	16.3	5	64,536	83.7	---	---	---
Virginia ------	2	(1)	---	6	36,887	13.0	12	202,704	71.2
West Virginia -	3	(1)	---	29	935,587	29.3	22	967,283	30.2
Total ----	35	423,473	7.0	78	1,626,367	26.8	67	2,774,269	45.7

State	5 to 6 feet			6 to 7 feet			8 feet and over			Total	
	Number of mines	Production		Number of mines	Production		Number of mines	Production		Number of mines	Production (net tons)
		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage		
Alabama -------	---	---	---	---	---	---	1	6,888	100.0	1	6,888
Kentucky ------	---	---	---	---	---	---	---	---	---	34	936,526
Ohio ----------	3	18,479	1.4	---	---	---	---	---	---	38	1,279,297
Pennsylvania --	---	---	---	---	---	---	---	---	---	29	291,112
Tennessee -----	---	---	---	---	---	---	---	---	---	8	77,128
Virginia ------	---	---	---	1	(1)	---	---	---	---	21	284,465
West Virginia -	11	642,966	20.1	6	(1)	---	2	(1)	---	73	3,199,984
Total ----	14	661,445	10.9	7	(1)	---	3	(1)	---	204	6,075,400

1/ Included in "Total" to avoid disclosure of individual operations.

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TABLE 6. - Number and production of all bituminous-coal and lignite mines in the United States, classified by thickness of seams mined in each State, in 1955

State	Less than 2 feet			2 to 3 feet			3 to 4 feet			4 to 5 feet		
	Number of mines	Production		Number of mines	Production		Number of mines	Production		Number of mines	Production	
		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage
Alabama	15	281,688	2.2	125	2,959,247	22.6	47	1,832,123	14.0	24	3,511,064	26.8
Alaska	---	---	---	---	---	---	---	---	---	---	---	---
Arizona	---	---	---	---	---	---	---	---	---	---	---	---
Arkansas	7	238,945	41.4	15	280,806	48.6	4	(1)	---	---	---	---
California (lignite)	---	---	---	---	---	---	---	---	---	---	---	---
Colorado	---	---	---	---	---	---	20	516,101	14.5	19	316,661	8.9
Georgia	6	12,471	100.0	---	---	---	---	---	---	---	---	---
Illinois	2	(1)	---	4	(1)	---	20	5,152,287	11.2	60	7,373,381	16.1
Indiana	3	(1)	---	10	762,374	4.7	20	3,238,061	20.1	27	4,902,611	30.4
Iowa	---	---	---	12	94,553	7.5	19	607,471	48.3	17	(1)	---
Kansas	18	700,840	94.4	3	11,450	1.5	3	29,992	4.1	---	---	---
Kentucky	3	(1)	---	394	4,306,859	6.3	1,025	21,955,762	31.8	451	20,450,166	29.6
Maryland	---	---	---	35	234,791	45.8	21	116,742	22.8	6	30,892	6.0
Missouri	16	681,395	21.1	12	1,734,719	53.7	13	753,400	23.3	5	(1)	---
Montana (bit. & lig.)	---	---	---	---	---	---	2	(1)	---	4	271,603	21.8
New Mexico	---	---	---	1	(1)	---	8	30,493	15.1	9	29,500	14.6
North Dakota (lignite)	---	---	---	---	---	---	---	---	---	2	(1)	---
Ohio	4	(1)	---	97	4,170,567	11.0	213	12,009,951	31.7	157	16,205,742	42.8
Oklahoma	12	843,869	39.0	11	232,848	10.8	8	765,753	35.4	4	321,066	14.8
Pennsylvania	46	1,112,241	1.3	359	10,765,501	12.5	575	22,708,161	26.5	207	6,732,594	7.9
South Dakota (lignite)	---	---	---	---	---	---	---	---	---	2	25,782	100.0
Tennessee	16	(1)	---	136	1,417,133	20.1	281	3,631,051	51.5	61	653,920	9.3
Utah	---	---	---	---	---	---	---	---	---	6	(1)	---
Virginia	1	(1)	---	406	3,987,037	17.0	381	6,595,436	28.1	219	5,964,917	25.4
Washington	---	---	---	---	---	---	1	(1)	---	---	---	---
West Virginia	---	---	---	188	6,326,748	4.5	386	34,964,853	25.1	295	34,097,221	24.5
Wyoming	---	---	---	---	---	---	1	(1)	---	2	(1)	---
Other States	---	629,772	---	---	51,846	---	---	168,846	---	---	552,666	---
Total	149	4,501,221	1.0	1,808	37,336,479	8.0	3,048	115,076,483	24.8	1,577	101,439,786	21.8

State	5 to 6 feet			6 to 7 feet			7 to 8 feet			8 feet and over			Total	
	Number of mines	Production		Number of mines	Production		Number of mines	Production		Number of mines	Production		Number of mines	Production (net tons)
		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage		Net tons	Percentage		
Alabama	20	4,136,737	31.6	1	(1)	---	2	(1)	---	1	(1)	---	235	13,088,477
Alaska	1	(1)	---	---	---	---	---	---	---	12	(1)	---	13	639,696
Arizona	2	8,898	100.0	---	---	---	---	---	---	---	---	---	2	8,898
Arkansas	---	---	---	---	---	---	1	(1)	---	---	---	---	27	577,726
California (lignite)	---	---	---	---	---	---	---	---	---	1	7,650	100.0	1	7,650
Colorado	20	1,019,761	28.6	24	234,410	6.5	5	160,248	4.5	29	1,320,749	37.0	117	3,567,930
Georgia	---	---	---	---	---	---	---	---	---	---	---	---	6	12,471
Illinois	27	5,854,606	12.7	33	10,883,749	23.7	14	8,114,468	17.7	11	8,505,693	18.5	171	45,932,114
Indiana	18	3,134,833	19.4	13	3,048,435	18.9	8	1,024,807	6.3	1	(1)	---	100	16,149,310
Iowa	9	149,922	11.9	3	(1)	---	---	---	---	---	---	---	60	1,258,357
Kansas	---	---	---	---	---	---	---	---	---	---	---	---	24	742,282
Kentucky	105	18,121,643	26.2	22	3,543,103	5.1	2	(1)	---	2	66,873	.1	2,004	69,019,910
Maryland	2	(1)	---	3	(1)	---	---	---	---	17	103,757	20.2	84	512,469
Missouri	1	(1)	---	---	---	---	---	---	---	---	---	---	47	3,232,485
Montana (bit. & lig.)	4	(1)	---	3	16,036	1.3	---	---	---	11	(1)	---	24	1,247,253
New Mexico	6	20,567	10.2	4	86,742	43.1	---	---	---	3	(1)	---	31	201,579
North Dakota (lignite)	2	(1)	---	8	214,647	6.9	8	323,419	10.4	25	2,533,959	81.7	45	3,102,087
Ohio	44	3,980,197	10.5	9	1,343,260	3.6	4	(1)	---	2	(1)	---	530	37,869,791
Oklahoma	---	---	---	---	---	---	---	---	---	---	---	---	35	2,163,536
Pennsylvania	106	19,849,072	23.2	61	10,048,238	11.7	35	10,721,397	12.5	22	3,776,252	4.4	1,411	85,713,456
South Dakota (lignite)	---	---	---	---	---	---	---	---	---	---	---	---	2	25,782
Tennessee	9	812,030	11.5	1	(1)	---	---	---	---	---	---	---	504	7,052,844
Utah	1	(1)	---	5	484,207	7.7	4	268,845	4.3	34	5,433,591	86.3	50	6,295,524
Virginia	38	2,176,769	9.2	8	3,235,023	13.8	3	1,210,194	5.1	3	(1)	---	1,059	23,507,509
Washington	6	377,863	62.0	---	---	---	2	(1)	---	4	108,968	17.9	13	609,730
West Virginia	142	23,956,722	17.2	106	23,371,763	16.8	84	13,011,280	9.4	36	3,439,302	2.5	1,237	139,167,889
Wyoming	2	(1)	---	1	(1)	---	3	498,605	17.0	15	2,185,341	74.7	24	2,926,593
Other States	---	261,786	---	---	335,484	---	---	850,632	---	---	1,906,906	---	---	---
Total	565	83,861,406	18.1	305	56,845,097	12.2	175	36,183,895	7.8	229	29,389,041	6.3	7,856	464,633,408

1/ Included in "Other States" to avoid disclosure of individual operations.

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TABLE 7. - Number and production of bituminous-coal and lignite mines in the United States, classified by size of output and thickness of seams mined in 1920, 1945, 1950, and 1955

Year and size of output	Less than 2 feet			2 to 3 feet			3 to 4 feet			4 to 5 feet			5 to 6 feet		
	Number of mines	Production (thousand net tons)	Percentage of total production	Number of mines	Production (thousand net tons)	Percentage of total production	Number of mines	Production (thousand net tons)	Percentage of total production	Number of mines	Production (thousand net tons)	Percentage of total production	Number of mines	Production (thousand net tons)	Percentage of total production
1920: 1/															
Mines producing less than 10,000 tons	71	318	3.1	415	1,841	18.0	520	2,407	23.6	291	1,369	13.4	175	765	7.5
Mines producing 10,000 to 50,000 tons	54	1,244	1.5	581	13,670	16.9	1,040	26,093	32.2	698	18,493	22.8	415	11,249	14.0
Mines producing 50,000 to 100,000 tons	13	80	.9	115	7,859	8.6	400	27,913	30.5	366	26,190	28.6	202	14,506	15.9
Mines producing 100,000 to 200,000 tons	1	116	.1	40	5,766	4.0	208	27,911	19.5	318	44,326	30.9	236	33,490	23.4
Mines producing more than 200,000 tons	---	---	---	8	2,217	.9	72	20,032	8.4	119	35,994	15.1	194	65,579	27.6
Total	139	2,481	0.4	1,159	31,353	5.6	2,240	104,356	18.5	1,792	126,372	22.4	1,222	125,589	22.3
1945:															
Mines producing less than 10,000 tons	70	289	2.3	497	1,610	12.7	1,046	4,197	33.1	763	3,300	26.0	376	1,586	12.5
Mines producing 10,000 to 50,000 tons	26	617	1.4	262	6,198	13.8	603	13,948	31.1	468	10,677	23.8	224	5,494	12.3
Mines producing 50,000 to 100,000 tons	11	735	1.7	81	5,561	12.7	205	15,067	34.4	136	8,866	20.3	69	4,665	10.7
Mines producing 100,000 to 200,000 tons	6	851	1.0	62	8,766	10.3	204	29,105	34.5	157	22,746	27.0	64	8,954	10.6
Mines producing more than 200,000 tons	13	4,377	1.1	34	10,949	2.8	192	76,464	19.5	186	90,759	23.2	105	54,433	13.9
Total	126	6,969	1.2	936	32,984	5.7	2,250	138,781	24.0	1,710	136,348	23.6	838	75,132	13.0
1950:															
Mines producing less than 10,000 tons	88	332	1.5	786	3,914	17.8	2,921	9,808	44.7	743	4,633	21.1	308	1,379	6.3
Mines producing 10,000 to 50,000 tons	28	641	1.2	300	6,771	12.9	1,044	22,048	41.9	456	10,677	20.3	221	5,141	9.8
Mines producing 50,000 to 100,000 tons	9	669	1.5	116	8,360	18.8	217	15,250	34.4	126	9,271	20.9	56	4,009	9.0
Mines producing 100,000 to 200,000 tons	10	1,383	1.9	67	9,331	12.9	198	27,995	38.7	104	14,796	20.4	52	7,265	10.0
Mines producing more than 200,000 tons	3	852	.3	22	7,283	2.2	187	65,233	20.1	154	69,081	21.3	107	57,321	17.6
Total	138	3,877	.8	1,291	35,659	6.9	4,567	140,334	27.2	1,583	108,458	21.0	744	75,115	14.6
1955:															
Mines producing less than 10,000 tons	86	320	1.7	1,182	4,923	25.9	1,915	7,941	41.8	867	3,372	17.8	270	1,144	6.0
Mines producing 10,000 to 50,000 tons	39	990	2.4	451	9,741	24.0	692	14,305	34.5	407	8,534	21.0	123	2,831	7.0
Mines producing 50,000 to 100,000 tons	10	681	2.0	95	6,487	19.6	171	12,246	36.9	108	7,886	23.8	33	2,512	7.6
Mines producing 100,000 to 200,000 tons	10	1,164	2.5	57	7,830	16.9	117	16,312	34.7	76	11,284	24.4	35	4,970	10.8
Mines producing more than 200,000 tons	4	1,346	.4	23	8,355	2.6	153	64,872	19.9	119	70,364	21.6	104	72,405	22.2
Total	149	4,501	1.0	1,808	37,336	8.0	3,048	115,076	24.8	1,577	101,440	21.8	565	83,862	18.1

Year and size of output	6 to 7 feet			7 to 8 feet			8 feet and over			Unspecified			Total	
	Number of mines	Production (thousand net tons)	Percentage of total production	Number of mines	Production (thousand net tons)	Percentage of total production	Number of mines	Production (thousand net tons)	Percentage of total production	Number of mines	Production (thousand net tons)	Percentage of total production	Number of mines	Production (thousand net tons)
1920: 1/														
Mines producing less than 10,000 tons	63	300	2.9	52	244	2.4	55	208	2.0	1,048	2,769	27.1	2,690	[illegible]
Mines producing 10,000 to 50,000 tons	152	4,256	5.3	83	2,130	2.6	72	1,873	2.3	101	1,961	2.4	3,196	[illegible]
Mines producing 50,000 to 100,000 tons	109	7,817	8.5	54	3,929	4.3	31	2,070	2.3	6	374	.4	1,296	[illegible]
Mines producing 100,000 to 200,000 tons	102	14,294	10.0	81	12,231	8.5	33	4,550	3.2	4	549	.4	1,023	[illegible]
Mines producing more than 200,000 tons	133	49,588	20.9	123	44,799	18.8	51	19,151	8.1	2	512	.2	702	[illegible]
Total	559	76,255	13.5	393	63,333	11.2	242	27,852	5.0	1,161	6,165	1.1	8,907	[illegible]
1945:														
Mines producing less than 10,000 tons	199	939	7.4	79	360	2.7	110	419	3.3	---	(2)	---	3,140	[illegible]
Mines producing 10,000 to 50,000 tons	170	3,772	8.4	67	1,674	3.8	100	2,435	5.4	---	(2)	---	1,920	[illegible]
Mines producing 50,000 to 100,000 tons	60	4,233	9.8	31	2,069	4.7	36	2,511	5.7	---	(2)	---	629	[illegible]
Mines producing 100,000 to 200,000 tons	54	7,590	9.0	22	3,324	3.9	22	3,121	3.7	---	(2)	---	591	[illegible]
Mines producing more than 200,000 tons	104	67,154	17.1	61	43,805	11.2	58	44,067	11.2	---	(2)	---	753	[illegible]
Total	587	83,738	14.5	260	51,212	8.9	326	52,553	9.1	---	(2)	---	7,033	[illegible]
1950:														
Mines producing less than 10,000 tons	185	833	3.8	90	387	1.8	131	654	3.0	---	(2)	---	5,252	[illegible]
Mines producing 10,000 to 50,000 tons	155	3,647	6.9	72	1,577	3.0	91	2,110	4.0	---	(2)	---	2,367	[illegible]
Mines producing 50,000 to 100,000 tons	47	3,244	7.3	21	1,528	3.5	30	2,053	4.6	---	(2)	---	622	[illegible]
Mines producing 100,000 to 200,000 tons	42	5,977	8.3	15	1,941	2.7	26	3,682	5.1	---	(2)	---	514	[illegible]
Mines producing more than 200,000 tons	96	62,739	19.3	52	29,577	9.1	53	32,919	10.1	---	(2)	---	674	[illegible]
Total	525	76,440	14.8	250	35,010	6.8	331	41,418	8.0	---	(2)	---	9,429	[illegible]
1955:														
Mines producing less than 10,000 tons	122	580	3.1	60	266	1.4	99	439	2.3	---	(2)	---	4,601	[illegible]
Mines producing 10,000 to 50,000 tons	86	1,984	4.9	58	1,234	3.0	54	1,304	3.2	---	(2)	---	1,910	[illegible]
Mines producing 50,000 to 100,000 tons	20	1,325	4.0	12	815	2.5	17	1,196	3.6	---	(2)	---	466	[illegible]
Mines producing 100,000 to 200,000 tons	15	2,128	4.6	5	659	1.4	15	2,155	4.7	---	(2)	---	330	[illegible]
Mines producing more than 200,000 tons	62	50,828	15.6	40	33,210	10.3	44	24,295	7.5	---	(2)	---	549	[illegible]
Total	305	56,845	12.2	175	36,184	7.8	229	29,389	6.3	---	(2)	---	7,856	[illegible]

1/ Report of the United States Coal Commission, part III, opp. p. 1890.
2/ "Unspecified" seam thicknesses were estimated from various sources.

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TABLE 8. - Overburden at bituminous-coal and lignite strip mines in the United States, 1946, 1950, and 1955

State	Number of strip mines			Mined by stripping (net tons)			Overburden excavated: Cubic yards per net ton of coal mined			Overburden excavated: Average thickness (feet)			Coal seam mined-average thickness (feet)		
	1946	1950	1955	1946	1950	1955	1946	1950	1955	1946	1950	1955	1946	1950	1955
Alabama	43	46	39	1,815,146	1,888,038	2,110,979	8.5	9.0	17.0	24.7	25.0	47.4	3.9	3.3	3.2
Alaska	2	5	7	86,636	130,737	400,125	(1)	(1)	4.6	(1)	60.7	94.3	(1)	2/ 13.2	23.7
Arkansas	20	15	8	563,242	504,946	260,725	9.5	16.1	21.5	27.2	22.8	32.4	4.2	5.7	1.7
Colorado	4	8	7	155,023	406,713	356,805	4.4	6.7	6.0	40.0	27.0	40.0	10.0	8.3	6.2
Georgia	1	---	---	88,965	---	---	(1)	---	---	(1)	---	---	(1)	---	---
Illinois	46	81	68	15,161,818	17,612,423	18,675,619	12.4	13.4	12.8	43.2	47.1	48.7	4.5	5.0	4.8
Indiana	50	44	56	11,826,355	10,739,567	11,182,221	10.1	11.5	14.5	37.2	40.0	43.2	4.2	4.4	4.4
Iowa	23	37	30	630,833	1,190,511	960,867	10.9	9.1	10.7	37.6	26.3	36.9	4.1	4.9	3.9
Kansas	30	32	19	2,282,721	2,024,352	727,463	23.4	19.4	24.6	33.6	30.7	28.7	1.6	1.9	1.6
Kentucky:															
Eastern	24	72	72	1,444,191	2,510,358	1,902,493	8.2	8.8	(1)	27.8	38.8	29.3	3.6	5.6	3.3
Western	32	64	46	5,910,173	11,467,285	11,740,747	5.3	5.3	6.9	28.8	38.2	37.6	5.9	5.2	5.0
Total Kentucky	56	136	118	7,354,364	13,977,643	13,643,240	5.5	5.3	6.9	28.7	38.2	37.3	5.4	5.3	4.8
Maryland	23	22	26	557,730	161,054	237,015	3.5	(1)	---	28.7	27.4	30.0	8.3	4.7	4.7
Missouri	29	43	28	3,340,921	2,635,424	3,075,382	15.1	17.1	19.8	30.3	32.5	33.6	2.5	3.3	2.5
Montana (bit. & lig.)	2	2	5	2,453,832	1,717,179	807,968	2.2	2.8	1.2	49.2	63.8	32.0	25.0	22.9	23.5
New Mexico	---	---	3	---	---	27,280	---	---	4.0	---	---	23.0	---	---	6.3
North Dakota (lignite)	28	37	40	2,127,576	2,828,056	3,080,730	5.2	5.6	4.7	47.5	38.2	43.3	10.3	9.4	12.1
Ohio	197	303	259	14,206,939	22,775,193	23,958,329	8.4	10.9	14.6	25.8	36.7	41.3	3.7	3.8	3.8
Oklahoma	22	29	21	1,672,494	1,727,174	1,469,213	14.9	19.3	22.9	29.0	31.7	32.4	2.0	2.1	2.3
Pennsylvania	640	726	484	31,686,807	26,426,597	20,518,113	8.7	9.6	14.1	25.3	33.3	40.9	4.1	3.7	3.2
Tennessee	7	16	87	196,207	584,066	1,635,052	10.4	16.1	11.4	21.4	27.1	24.4	2.4	2.9	2.5
Texas (lignite)	1	1	---	55,978	18,169	---	2.8	3.1	---	30.0	25.0	---	12.0	12.0	---
Virginia	15	19	31	655,816	1,565,646	981,782	4.8	6.3	6.9	28.2	50.1	38.4	7.8	6.1	5.0
Washington	8	4	1	97,556	70,540	31,714	6.9	2.8	5.0	23.3	23.6	25.0	7.1	7.0	5.5
West Virginia	186	249	168	14,937,127	12,986,154	9,379,643	6.4	6.5	8.9	30.9	38.5	37.0	6.1	5.5	5.8
Wyoming	9	12	8	992,685	1,458,899	1,539,072	2.1	2.1	1.6	46.3	38.2	29.3	28.1	38.3	33.1
Other States:															
California and South Dakota (lignite)	3	3	3	16,946	37,483	33,432	8.5	10.8	6.5	33.1	33.4	33.2	4.4	4.4	5.3
Total	1,445	1,870	1,516	112,963,717	123,466,564	115,092,769	9.1	10.7	12.3	31.6	39.0	41.6	5.2	5.1	4.9

1/ Data not available.
2/ Revised.

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